REMARKS

Applicants wish to thank Examiners David Vincent and Peter Coughlan for the telephone interview held on April 10, 2007. The Examiners suggested several amendments, including removing the "configured to" language, and clarifying the "human-readable format." Accordingly, with this response, Applicant is amending the independent claims to further clarify the invention.

For the Examiner's convenience and reference, Applicants' remarks are presented in the order in which the corresponding issues were raised in the Office Action. The distinctions identified and discussed below are presented solely by way of example to illustrate some of the differences between the claimed invention and the cited references. In addition, Applicants request that the Examiner carefully review any references discussed below to ensure that Applicants' understanding and discussion of the references, if any, is consistent with the Examiner's understanding.

STATUS OF THE CLAIMS

Claims 1-7, 9-13, 15-25, and 27-40 remain in the case. Claims 1-7, 9-13, 15-25, and 27-40 stand rejected. No new claims have been added. Claims 8, 14, and 26 have been canceled.

RESPONSE TO CLAIM REJECTIONS UNDER 35 U.S.C. § 101

Claims 1-24 and 30-40 stand rejected under 35 U.S.C. §101 for nonstatutory subject matter. The Examiner's position is that independent claims 1, 7, 13, 18, 30, and 36 each fail to "set forth a practical application of that §101 judicial exception to produce a real-world result." Applicants respectfully disagree.

"For an invention to be 'useful', it must satisfy the utility requirement of section 101." MPEP §2106 (IV)(C)(2)(2)(a). "An invention has a well-established utility if (i) a person of ordinary skill in the art would immediately appreciate why the invention is useful based on the characteristics of the invention… and (ii) the utility is specific, substantial, and credible." MPEP §2107 (II)(A)(3). The tangible requirement dictates that "the process claim must set forth a practical application… to produce a real-world result." MPEP §2106(IV)(C)(2)(2)(b). "In other words, the opposite meaning of 'tangible' is 'abstract.'" Id.

Amended claim 7 discloses "a determination module to selectively forecast failure of one or more components of the storage system." Similarly, amended claim 13 discloses "an analysis module to execute machine-readable code programmed to selectively predict failure of the storage media and the drive mechanism." This language is substantially similar to the language of claim 25, "selectively forecasting failure of one or more components," which the examiner states "discloses enough information to state what the practical application of the invention is." Applicants submit that the language in amended claims 7 and 13 also states what the practical application of the invention is.

Amended claims 1, 18, 30, and 36 disclose generating machine-readable code from a natural language failure prediction algorithm comprising fuzzy logic rules. It is readily apparent to one skilled in the art that an invention that generates machine-readable code from a natural language algorithm would be useful. This ability to generate machine-readable code is specific, substantial, and credible. The real-world result is that the code generator generates machine-readable code. Generating machine-readable code from a natural language algorithm is like voice-recognition software that generates a text file from a series of verbally spoken words. This allows a user that is not familiar with computer programming or machine-readable code to create

machine-readable code by entering a natural language algorithm, just like voice-recognition software allows a user that has difficulty typing to create a text file.

The Examiner has not explained his position on why generating machine-readable code does not constitute a useful result. Applicants invite such an explanation if the Examiner chooses to maintain this rejection. Applicants note, that "[T]he transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price... produces a 'useful, concrete and tangible result' ..." State Street Bank & Trust Co., v. Signature Financial Group, Inc., 149 F.3d 1368, 1373 (Fed. Cir. 1998). The result produced in the present application (a machine-readable code failure prediction algorithm comprising fuzzy logic rules), is at least as useful, concrete and tangible a result as that described in State Street (a momentarily fixed share price) above. Applicants respectfully submit that the Examiner should therefore allow claims 1-24 and 30-40 under 35 U.S.C. §101.

RESPONSE TO CLAIM REJECTIONS UNDER 35 U.S.C. §112

Claims 3, 21, 26, 32, 37, and 38 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. The Examiner states that "claim 37 recites the limitation 'fuzzy logic rules B' which is not in the specification," and further that "adjusting a fuzzy variable" from claims 3, 21, 26, 32, and 38 is not described in the specification. Applicants respectfully disagree.

Applicants submit that claim 37 does not recite "fuzzy logic rules B," but that the "B" is a misprint due to OCR software used by the Examiner, as discussed in the telephone interview of April 10, 2007. Claim 37 recites "fuzzy logic rules." Applicants submit that this limitation is supported in the specification in paragraphs 15, 18, 20-22, 50-51, 92-95, and 127.

Applicants also submit that "adjusting a fuzzy variable" and the motivation for the adjustment are supported in paragraphs 92-95, and 127 of the specification. Paragraph 95 of the specification states that:

> "if a user is not satisfied with the sensitivity of the failure prediction algorithm 206 to certain types of temporary or soft errors, **a user may adjust 516 one of the fuzzy variable definitions** by changing one or more of the configuration parameters that cooperate to define the fuzzy variable. In this manner, a user is able to tune the failure prediction algorithm 206." (emphasis added)

Further, paragraph 127 of the specification states that:

> "In one embodiment, the machine-readable code 710 includes an interface 311 configured to **allow a user to selectively adjust a fuzzy variable definition to tune the failure prediction algorithm 206**. For example, the interface 311 may comprise user-adjustable values that define the transition points, which may be the tuples for pairs defining one or more terms of one or more fuzzy variables." (emphasis added)

Applicants submit that the description of "adjusting a fuzzy variable" in paragraphs 92-95 and 127 reasonably conveys to one skilled in the relevant art that Applicants had possession of the claimed invention at the time the application was filed. One of reasonable skill in the art would recognize that the words "adjust" and "adjusting" both have the same root and are simply different forms of the same word, and that "adjust a fuzzy variable" in paragraphs 95 and 127 and the accompanying description of the motivation supports "adjusting a fuzzy variable," in claims 3, 21, 26, 32, and 38. Applicants respectfully submit that the Examiner should therefore allow claims 3, 21, 26, 32, 37, and 38 under 35 U.S.C. §112.

RESPONSE TO CLAIM REJECTIONS UNDER 35 U.S.C. §102(b)

Claims 7 and 13 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,314,377 to Ottesen et al. (hereinafter "Ottesen"). Applicant respectfully asserts that Ottesen does not teach or suggest all of the elements of claims 7 and 13 in view of the amendments and the following remarks.

"Anticipation under 35 U.S.C. §102 requires the disclosure in an single piece of prior art of each and every limitation of a claimed invention. ...Whether such art is anticipating is a question of fact." *Apple Computer, Inc. v. Articulate Systems, Inc.* 234 F.3d 14, 20, 57 USPQ2d 1057, 1061 (Fed. Cir. 2000). Applicants submit that Ottesen does not disclose each and every limitation of amended claims 7 and 13.

Claim 7 is amended to include "an interface to adjust a predefined quality threshold of the determination module in response to user input." Claim 13 is amended to include "an interface to selectively adjust a fuzzy variable definition." Applicants respectfully submit that Ottesen

does not disclose either interface, and does not teach or suggest adjusting a predefined quality threshold or adjusting a fuzzy variable definition.

Applicants further submit that the "fuzzy logic membership" of Ottesen is not equivalent to Applicants' "failure prediction algorithm comprising fuzzy logic rules" of amended claims 7 and 13. Ottesen teaches the use of fuzzy logic *membership* for arranging drive assemblies to limit vibration, and does not teach fuzzy logic *rules*. A membership, or set, is not a rule. Fuzzy logic rules are conditional statements that involve fuzzy logic memberships and define relationships between fuzzy logic memberships (a fuzzy logic membership is a fuzzy logic set) as described in paragraphs 96, and 111-118 in the specification.

Ottesen teaches failure *prevention* by limiting vibration, not failure *prediction*. Ottesen does not disclose a failure prediction algorithm comprising fuzzy log rules, and specifically teaches away from the use of fuzzy logic memberships to determine or predict drive failure or suitability for use. After describing his fuzzy logic membership, Ottesen states:

> "It should be noted that the present invention provides a method and system for properly arranging drive assemblies and **not for determining whether or not a given drive assembly may be utilized within an array**." (Ottesen, C7:55-62, emphasis added).

Amended claims 7 and 13 are specifically directed towards "predicting component failure within a storage system." Predicting component failure within a storage system includes determining whether or not a component, like a drive assembly, may be utilized within a storage system, like an array. Ottesen specifically teaches away from this. Although Ottesen does disclose the use of PFA and DRP failure prediction and data recovery techniques in the Background of the Invention, Ottesen does not disclose the use of fuzzy logic with either technique, and teaches away from its use as described above. Applicants respectfully submit that claims 7 and 13 are allowable over Ottesen under 35 U.S.C. §102.

RESPONSE TO CLAIM REJECTIONS UNDER 35 U.S.C. §103(a)

Claim 14 stands rejected under 35 U.S.C. §103(a) as being unpatentable in view of Ottesen and Awadallah, ('Application of AI tools in fault diagnosis of electrical machines and drives - an overview,' hereinafter Awadallah). Claims 1, 2, 3, 4, and 6 stand rejected under 35 U.S.C. §103(a) as being unpatentable in view of Ottesen, Awadallah, and U.S. Patent No.

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6,446,081 to Preston (hereinafter Preston). Claims 5, 18-24, and 30-39 stand rejected under 35 U.S.C. §103(a) as being unpatentable in view of Ottesen, Awadallah, Preston, and U.S. Patent No. 4,907,230 to Heller et al. (hereinafter Heller). Claim 40 stands rejected under 35 U.S.C. §103(a) as being unpatentable in view of Ottesen, Awadallah, Preston, Heller and U.S. Patent No. 6,397,202 to Higgens et al. (hereinafter Higgens). Claim 25 stands rejected under 35 U.S.C. §103(a) as being unpatentable in view of Ottesen, and Heller. Claims 15, 26, and 29 stand rejected under 35 U.S.C. §103(a) as being unpatentable in view of Ottesen, Awadallah, and Heller. Claims 16, 17, 27, and 28 stand rejected under 35 U.S.C. §103(a) as being unpatentable in view of Ottesen, Awadallah, Heller, and U.S. Patent No. 6,553,369 to Guay et al. (hereinafter Guay). Claims 8, 9, and 10 stand rejected under 35 U.S.C. §103(a) as being unpatentable in view of Ottesen, Awadallah, Heller, and U.S. Patent No. 6,219,805 to Jones et al. (hereinafter Jones). Claims 11, and 12 stand rejected under 35 U.S.C. §103(a) as being unpatentable in view of Ottesen, Awadallah, Heller, Jones, and Guay.

"To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art." MPEP §2143.03. Even if all the claim limitations are taught or suggested, there must be some suggestion or motivation to combine reference teachings. See MPEP § 2142. This suggestion or motivation to combine references must be established by factual findings. "The factual inquiry whether to combine references must be thorough and searching. (quoting McGinley v. Franklin Sports, Inc. 262 F.3d 1339, 1351-52, 60 USPQ2d 1001, 1008 (Fed. Cir. 2001)). It must be based on objective evidence of record." In re Lee, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002). Furthermore, "[an] examiner's conclusory statements that [the court quotes the conclusory statements] do not adequately address the issue of motivation to combine. This factual question of motivation is material to patentability..." In re Lee, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002).

Ottesen

Applicant submits that because each of the Examiner's §103(a) rejections is based on Ottesen, which does not include the limitation "failure prediction algorithm comprising fuzzy

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logic rules" as described above, and because independent claims 1, 7, 13, 18, 25, 30, and 36 each include the limitation, that claims 1-6, 9-12, are 15-40 allowable under §103(a).

Further, Applicants respectfully submit that Ottesen does not teach "an editor ~~configured~~ to assist a user in generating a failure prediction algorithm comprising fuzzy logic rules, the failure prediction algorithm stored in a ~~human-readable~~ natural language format" of amended claim 1. Ottesen teaches a graphical user interface where "the user is able to develop and verify an optimal strategy for arranging drive assemblies." (Ottesen C4:53-55) Ottesen's strategy for arranging drive assemblies is not a failure prediction algorithm, does not comprise fuzzy logic rules, and Ottesen does not teach storing his strategy in either human-readable or natural language.

The Office Action also states that Ottesen teaches that the "test module is further configured to tune the failure prediction algorithm by adjusting a fuzzy variable definition" with regards to claim 3, without a reference to Ottesen (Office Action, pg 11). Applicants respectfully submit that this teaching cannot be found in Ottesen.

Awadallah

The Office Action states that Awadallah's "adjust[ing] the system parameter set" teaches "an interface to selectively adjust a fuzzy variable definition to tune the failure prediction algorithm" of original claim 14, "a revision module configured to allow revisions of the failure prediction algorithm such that the result corresponds to an expected result" of original claim 1, and similar references in original claims 2-6, 11-12, 15-24, and 26-40. Applicants respectfully disagree.

Applicants submit that based on the amendments to claims 1, 13, and the other claims mentioned above, particularly in adding "in response to user input," that Awadallah does not teach the interface or the revision module. The full sentence in Awadallah states "adaptive fuzzy systems utilize the learning capabilities of ANNs or the optimization strength of genetic algorithms to adjust the system parameter set in order to enhance the intelligent system's performance based on a priori knowledge." (Awadallah p249 C1:29-48). Applicants respectfully submit that Awadallah does not teach adjusting a fuzzy variable or a failure prediction algorithm

in response to user input, only in response to artificial neural networks and genetic algorithms, both of which are unrelated to the present invention.

Preston

The Office Action states that Preston teaches a "code generator configured to generate machine-readable code from the stored failure prediction algorithm" of original claim 1, "linguistic variables having less than four terms" of original claims 2, 19, and 20, and similar language in original claims 3-6, 18-24, and 30-40. Applicants respectfully disagree.

The Office Action refers to C2:46-51 of Preston as teaching a "code generator configured to generate machine-readable code from the stored failure prediction algorithm" of original claim 1. The referenced section, however, teaches a code generator that generates a computer program from a "graphical representation." Amended claim 1 and subsequent claims clarify that "the failure prediction algorithm [is] stored in a natural language format," not as a graphical representation. Applicant further submits that Preston does not teach limiting the use of linguistic variables to less than four terms, and does not recommend a suggested number of linguistic variables to use.

Heller

The Office Action states that Heller teaches "the revision module comprises a text editor configured to revise the failure prediction algorithm" of original claim 5, "testing the machine-readable code to produce a result" of original claim 18, and similar teachings in original claims 8-10, and 16-40. The elements are also found in additional claims. Applicants respectfully disagree.

Heller teaches the use of a text editor "to view, create, or edit a source code." (Heller C23:43-48). Heller does not teach the use of a text editor to "revise the failure prediction algorithm" that is stored not as source code, but in a "natural language format," according to amended claim 1.

Applicant submits that Heller does not teach the testing of machine-readable code. Heller teaches the testing of printed circuit boards and their components. The Office Action suggests

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that this teaching is found in Heller's abstract stating that output from sensors is being integrated into a host microcomputer to produce test results. Heller is teaching the use of a microcomputer, and likely machine-readable code, to produce test results, but does not teach the testing of machine-readable code.

Higgins

The Office Action states that Higgins teaches "adding fuzzy logic rules to the failure prediction algorithm" of original claim 40. Applicants respectfully disagree. Higgins, in a reference to another patent, mentions the use of a fuzzy logic expression that "generates rules… so as to add the rules to the rules related to the unmeasurable events." Applicants submit that Higgins teaches the use of fuzzy logic to generate rules, but does not teach the use or the addition of fuzzy logic rules.

Guay

The Office Action states that Guay teaches the "determination module configured to map a result from the failure prediction algorithm to one of a plurality of predefined recommendations" of original claim 16, and similar teachings of original claims 11-12, 17, and 27-28. Applicants respectfully disagree. In the passage cited in the Office Action (Guay C5:62-C6:6), Guay teaches "providing recommendations about attributes of the environment in which the administrative functions are performed to improve performing the administrative functions." Applicants submit that this is wholly unrelated to mapping the result of a failure prediction algorithm to a recommendation, and that Guay does not teach the mapping of original claim 16.

Jones

The Office Action states that Jones teaches the "determination module to adjust the degree of data loss risk and remedial costs associated with a forecasted failure of one or more components" of original claim 8, now included in amended claim 7 and similar teachings in original claims 9-10. Applicants respectfully disagree. The determination module of original claims 7 and 8 clearly deals with "components of the **storage system**" (emphasis added). Jones,

however, teaches a risk assessment system for "components of a **software system**." (Jones C1:60-63). Further, Jones does not teach adjusting the degree of data loss risk and remedial costs, just estimating it.

Appellants respectfully assert that if the prior art of record so clearly demonstrates the obviousness of the claimed invention, a single reference would teach more than just one or two elements of the claimed invention. However, the formation of the combinations used in the rejections is indicative of impermissible hindsight analysis by the Examiner. The sheer number of references used seems to indicate that the claim terms were used in a key word search of the prior art. For certain claims up to five different references are relied upon. Once a key word hit was found, there appears to be little analysis performed to determine the applicability of relevance of the reference. The four references cited regarding the relatively brief original claim 8, broken up in groups of a few words each is indicative of hindsight keyword analysis in support of a 103 obviousness rejection. Appellants respectfully assert that because such analysis is improper the rejections should be overturned.

Given that Ottesen, Awadallah, Preston, Heller, Higgins, Guay, and Jones fail to teach or suggest all of the elements recited in independent claims 1, 7, 13, 18, 25, 30, and 36 of the present application, Applicants respectfully submit that independent claims 1, 7, 13, 18, 25, 30, and 36 are patentable over Ottesen, Awadallah, Preston, Heller, Higgins, Guay, and Jones. Applicants also request that the rejection of claims 1, 18, 25, 30, and 36 under 35 U.S.C. §103(a) as being unpatentable over Ottesen, Awadallah, Preston, Heller, Higgins, Guay, and Jones be withdrawn. Applicants further request that the rejection of claims 7 and 13 under 35 U.S.C. §102(b) as being unpatentable over Ottesen be withdrawn. Given that dependent claims 2-6 depend from claim 1, that dependent claims 9-12 depend from claim 7, that dependent claims 15-17 depend from claim 13, that dependent claims 19-24 depend from claim 18, that dependent claims 27-29 depend from claim 25, that dependent claims 31-35 depend from claim 30, and that dependent claims 37-40 depend from claim 36, Applicants respectfully submit that Claims 2-6, 9-12, 15-17, 19-24, 27-29, 31-35 and 37-40 are also patentable over Ottesen, Awadallah, Preston, Heller, Higgins, Guay, and Jones and request that their rejection under 35 U.S.C. § 103(a) as

being unpatentable over Ottesen, Awadallah, Preston, Heller, Higgins, Guay, and Jones also be withdrawn.

CONCLUSION

As a result of the presented amendments and remarks, Applicant asserts that Claims 1-7, 9-13, 15-25, and 27-40, including the amendments, are patentable and in condition for prompt allowance. Should additional information be required regarding the amendments or traversal of the rejections of the independent and dependent claims enumerated above, the Examiner is respectfully asked to notify Applicants of such need. If any impediments to the prompt allowance of the claims can be resolved by a telephone conversation, the Examiner is respectfully requested to contact the undersigned.

Respectfully submitted,

Date: April 16, 2007   /Brian C. Kunzler/

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